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ABSTRACT

This is one form of three performance checks booklets (A, B, and C) for two texts of Level III of the Intermediate Science Curriculum Study (ISCS). These two texts are Why You're You (WYY), and Investigating Variation (IV). The 12 performance checks booklets for Level III are considered one of four major subdivisions of a set of individualized evaluation materials for Level III of the ISCS. This booklet (form C), developed to assess the students' achievement of the objectives of the WYY and IV texts of Level III, contains a set of performance checks which are equivalent to the performance checks of the other two forms (A and B). Each performance check has its own code number which indicates the unit number and identifies whether it is based on core materials or excursions. Directions for students' use of performance checks are also included. (HM)

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INTERMEDIATE SCIENCE CURRICULUM STUDY

ISCS

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INDIVIDUALIZED TESTING SYSTEM

Performance Checks

ISCS LEVEL III
WYY-IV
FORM C

SE 028 478

SILVER BURDETT
GENERAL LEARNING CORPORATION
Morristown, New Jersey · Park Ridge, Ill. · Palo Alto · Dallas · Atlanta

INDIVIDUALIZED TESTING SYSTEM

ALL LEVELS
Individualizing Objective Testing (an ITP module)
Evaluating and Reporting Progress (an ITP module)

LEVEL I
Performance Objectives, ISCS Level I
Performance Checks, ISCS Level I, Forms A, B, and C
Performance Assessment Resources, ISCS Level I, Parts 1 and 2

LEVEL II
Performance Objectives, ISCS Level II
Performance Checks, ISCS Level II, Forms A, B, and C
Performance Assessment Resources, ISCS Level II, Parts 1 and 2

LEVEL III
Performance Objectives, ISCS Level III
Performance Checks, ISCS Level III, ES-WB, Forms A, B, and C
WYY-IV, Forms A, B, and C
IO-WU, Forms A, B, and C
WW-CP, Forms A, B, and C
Performance Assessment Resources, ISCS Level III, ES-WB
WYY-IV
IO-WU
WW-CP

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FOREWORD

To implement an educational approach successfully, one must match the philosophy of evaluation with that of instruction. This is particularly true when individualization is the key element in the educational approach. Yet, as important as it is to achieve this match, the task is by no means simple for the teacher. In fact, without specific resource materials to help him, he is apt to find the task overwhelming. For this reason, ISCS has developed a set of individualized evaluation materials as part of its Individualized Teacher Preparation (ITP) program. These materials are designed to assist teachers in their transition to individualized instruction and to help them tailor their assessment of students' progress to the needs of all their students.

The two modules concerned with evaluation, *Individualizing Objective Testing* and *Evaluating and Reporting Progress*, can be used by small groups of teachers in in-service settings or by individual teachers in a local school environment. Hopefully, they will do more than give each teacher an overview of individualized evaluation. These ITP modules suggest key strategies for achieving both subjective and objective evaluation of each student's progress. And to make it easier for teachers to put such strategies into practice, ISCS has produced the associated booklets entitled *Performance Objectives, Performance Assessment Resources,* and *Performance Checks*. Using these materials, the teacher can objectively assess the student's mastery of the processes, skills, and subject matter of the ISCS program. And the teacher can obtain, at the moment when they are needed, specific suggestions for remedying the student's identified deficiencies.

If you are an ISCS teacher, selective use of these materials will guide you in developing an individualized evaluation program best suited to your own settings and thus further enhance the individualized character of your ISCS program.

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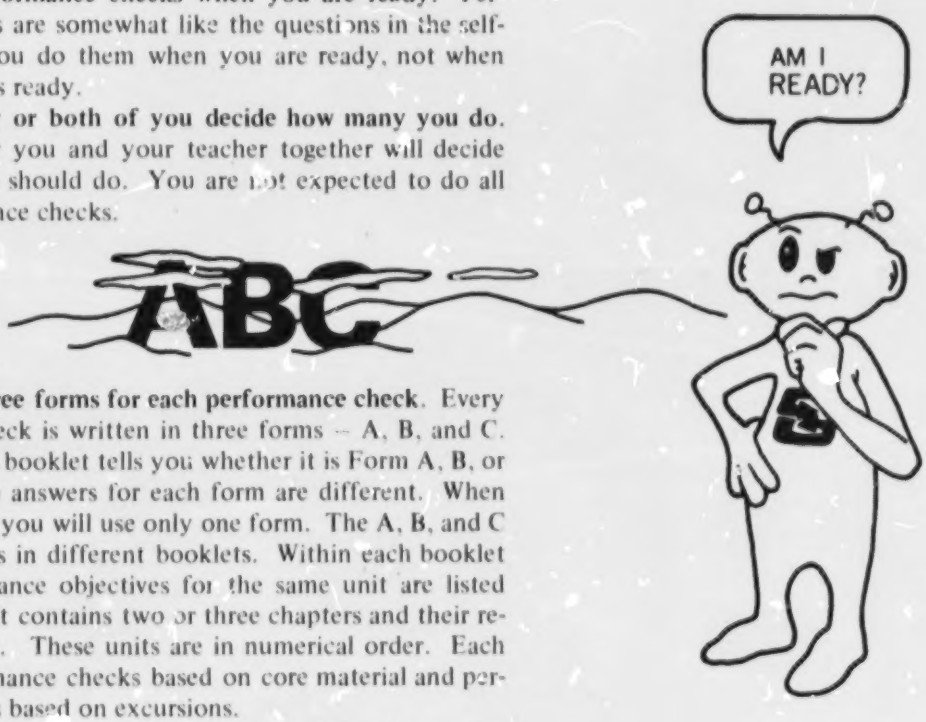
NOTES TO THE STUDENT

Now that you have completed several chapters, excursions, and self-evaluations, you are ready to help your teacher determine how well you are doing. The performance checks in this book will provide your teacher with this information. Then your teacher can help you with things you may not understand and can keep a record of your progress.

Read the next section carefully. It explains some important things about the performance checks in this book, and it gives you specific suggestions for using them.

What You Need To Know about Performance Checks

1. **You do performance checks when you are ready.** Performance checks are somewhat like the questions in the self-evaluations – you do them when you are ready, not when the whole class is ready.
2. **Your teacher or both of you decide how many you do.** Your teacher or you and your teacher together will decide which ones you should do. You are not expected to do all of the performance checks.



3. **There are three forms for each performance check.** Every performance check is written in three forms – A, B, and C. (The title of this booklet tells you whether it is Form A, B, or C.) Usually the answers for each form are different. When you do a check, you will use only one form. The A, B, and C forms are always in different booklets. Within each booklet all the performance objectives for the same unit are listed together. A unit contains two or three chapters and their related excursions. These units are in numerical order. Each unit has performance checks based on core material and performance checks based on excursions.
4. **Each performance check has its own number.** The number is in the outside margin of the page and will look like this: IV-03-Core-17A or WYY-02-Exc 4-2-2A. These numbers mean

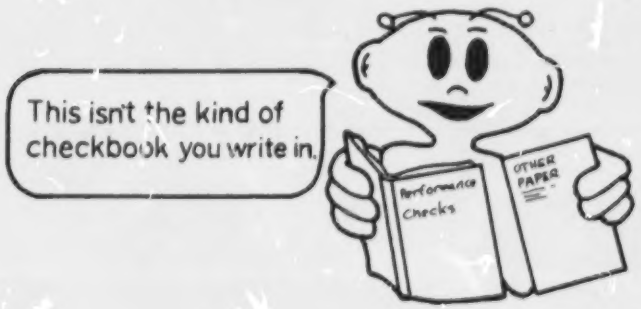
IV	-	03	-	Core	-	17	A	and	WYY	-	02	-	Exc	4-2	-	2	A
text		unit		based on core material		check number	form of the check		text		unit		based on excursion material	excursion number		check number	form of the check

5. **Each performance check is separated from the other.** There is a line before each performance check and one after it. Some performance checks have several parts, so do everything called for between the lines. If there is no line at the bottom of a page, the check is continued onto the next page.

6. **Sometimes you will need to use equipment.** If special materials are needed, they will be in boxes labeled with the same number and sometimes the same letter too as the performance check for which you need them.

7. **Some performance checks have two or more answers.** If more than one answer is correct, you must select all the correct choices. In such cases, selecting just one answer is not enough.

8. **Some performance checks have no answers.** Occasionally, you may be asked to do something that is impossible and to explain your answer. If so, say that the task is impossible and explain why.



9. **You share books of performance checks and YOU DO NOT WRITE IN THEM.** Write your answers on other paper. Give the number and form of the performance check for each answer you write. If you are to draw a graph, a chart, or a map, your teacher may provide you with grid paper or a copy of the map or chart.

10. **Your teacher or his assistant will collect and mark your checks.** And sometimes you must ask him to watch or assist you as you do a check.

11. **Sometimes a review procedure will be suggested.** If you can't do a performance check, you may be asked to review a part of the text or a self-evaluation question. You may then be checked on the same material, so be sure you understand the material you review. Get help if you need it.

Why You're You **WYY**

1. Where in plants and animals do sperm come from?
2. What does a sperm do?

WYY
01-Core-1C

Many organisms produce offspring by means of eggs and sperm.

1. What is the source of an egg?
2. What is the function of an egg?

WYY
01-Core-2C

When animals are mating, what happens to sperm?

WYY
01-Core-3C

Get vial WYY-01-Core-4, some ether, and an etherizer from the supply area. Etherize the fruit flies in the vial. Have your teacher check the etherized flies.

WYY
01-Core-4C

Get vial WYY-01-Core-5, two empty capped vials, an etherizer, and some ether from the supply area. Do not remove any flies from the vial at this point. Etherize all the flies in the vial. Shake the vial gently. Remove the fruit flies from the vial. Put the dead flies and the etherized flies into separate vials. Cap the vials, and label each as containing dead or etherized flies. Have your teacher check your work. Return all the flies to the vial you got them from.

WYY
01-Core-5C

Get vial WYY-01-Core-6, some ether, two empty vials with caps, and an etherizer from the supply area. Etherize the fruit flies. Separate the male flies from the females. Put the males into one of the empty vials and the females into the other. Cap the vials, and label each as containing male or female flies. Have your teacher check your work. Return all the flies to the original vials.

WYY
01-Core-6C

State the steps that you would follow to get virgin female fruit flies from a vial containing nonadult and adult fruit flies.

WYY
01-Core-7C

Operationally define the term *pure strain*.

WYY
01-Core-8C

The life cycle of a fruit fly consists of several stages. List these stages.

WYY
01-Core-9C

Get jar WYY-01-Core-10 and a hand lens from the supply area. Point out to your teacher the egg, the larva, the pupa, and the adult stages in the jar.

WYY
01-Core-10C

Clarence crossed some fruit flies that are pure strain for short wings with others that are pure strain for long wings. What appearance is possible for the first-generation offspring of such a cross?

WYY
01-Core-11C

WYY 01-Core-12C

Plants have many different features that show variation. In one experiment, George studied only one feature, seed smoothness, even though plants inherit many features at one time. Why would George study the inheritance of only one feature at a time?

WYY 01-Core-13C

Eric crossed pure-strain beans that had yellow flowers with pure-strain beans that had purple flowers. Then he crossed the first-generation offspring to get the second-generation offspring. Predict the color of the flowers in the first- and second-generation offspring by choosing the correct descriptions below.

1. Among the first-generation offspring
   a. all plants had the same color flowers.
   b. some plants had yellow flowers and some plants had purple flowers.
2. Among the second-generation offspring
   a. all plants had the same color flowers.
   b. some plants had yellow flowers and some plants had purple flowers.

WYY 01-Core-14C

Pedro crossed two pure-strain plants. One had yellow seeds, and the other had brown seeds. He crossed the first-generation offspring with each other. Predict the most likely ratio of variations of seed color he will get in the second-generation offspring.

WYY 01-Core-15C

Tell your teacher that you are about to do this check.

Get the box of beans labeled WYY-01-Core-15 from the supply area. Quickly and accurately, estimate the ratio of brown beans to white beans in the box.

WYY 01-Core-16C

Get vial C from box WYY-01-Core-16 in the supply area. Look carefully at the beans. Are they pure-strain beans?

WYY 01-Core-17C

The table below refers to the offspring produced by mating two dwarf corn plants.

GENERATION	PLANT SIZE
Parents	dwarf
1st-generation offspring	dwarf
2nd-generation offspring	dwarf

1. According to the ISCS two-bit model, is this variety of corn pure strain for size?
2. Explain your answer.

Suppose you crossed a sweet pea plant that was pure strain for white flowers with a sweet pea that was pure strain for red flowers. Which statement best describes the first-generation offspring of this cross?

WYY
01-Core-18C

a. There will be a 3-to-1 ratio of plants with red flowers to those with white flowers.
b. Half the plants will have white flowers, and half the plants will have red flowers.
c. Either all the plants will have red flowers, or all the plants will have white flowers.
d. All the plants will have red- and white-spotted flowers.
e. There will be a 3-to-1 ratio of plants with white flowers to those with red flowers.

Suppose you were to cross zinnias that were pure strain for yellow flowers with zinnias that were pure strain for red flowers. Select the statement that best describes the appearance of the second-generation offspring of this cross.

WYY
01-Core-19C

a. All of the plants will have half red flowers and half yellow flowers.
b. All of the plants will have one-color flowers, but I cannot tell if they will be yellow or red.
c. Some plants will have all yellow flowers, and the others will have all red flowers. There will be a 3-to-1 ratio of the colors.
d. Half of the plants will have all red flowers, and the other half will have all yellow flowers.
e. All of the flowers will be orange.

Two pure strains of potatoes were crossed. In the second-generation offspring of this cross, there were 62 plants that produced tan potatoes and 201 plants that produced red potatoes.

WYY
01-Core-20C

1. What did the potatoes produced by the first-generation offspring look like?
2. What did the potatoes produced by the parent plants look like?

Your teacher will observe you for this check when he can.

WYY
01-Core-21C

Your teacher will observe you for this check when he can.

WYY
01-Core-22C

Your teacher will observe you for this check when he can.

WYY
01-Core-23C

Your teacher will observe you for this check when he can.

WYY
01-Core-24C

WYY 01-Core-25C	Your teacher will observe you for this check when he can.
WYY 01-Exc 1-1-1C	In reporting inheritance experiments, the word *cross* is often used. Define the word *cross* as it is used in such reports.
WYY 01-Exc 1-2-1C	Below are two definitions of ways in which people differ. Study these definitions, and answer the questions that follow. Definition a: A woman's *beauty index* is her ability to wear makeup well. Definition b: A person's *swim index* is a measure of how fast she can swim short distances. It is measured by timing how long it takes her to swim 100 meters, using any stroke. 1. Which of the above is an operational definition? 2. Explain the reason for your answer.
WYY 01-Exc 1-2-2C	List the two questions that should, whenever possible, be answered by an operational definition.
WYY 01-Exc 1-3-1C	Jennifer was using a jar with a piece of ripe banana in it to trap wild fruit flies to investigate their feature variations. During the winter, she found that she trapped very few flies each day. Explain why so few flies develop during the winter.
WYY 01-Exc 1-4-1C	What is the total number of bits of information that all of Perry's great-grandparents had for the feature dimples?
WYY 01-Exc 1-4-2C	Lucas has brown eyes. His great-great-grandmother Ethel had brown eyes, his great-great-grandmother Carol had blue eyes, and his great-great-grandfather Jonas had brown eyes. 1. Can you determine which of his three great-great-grandparents contributed the bits for Lucas's brown eyes? 2. Explain your answer.
WYY 01-Exc 2-1-1C	In English class, the teacher found that 25 students had read a novel and 8 students had not. What is the rough ratio of students who had read the novel to those who had not? Express the ratio to the nearest tenth, or 1 decimal place.
WYY 01-Exc 2-1-2C	Linda calculated the rough ratios shown below. Convert these to rounded-off ratios. 1. 4.9 to 1 2. 3.2 to 1 3. 8.8 to 1 4. 13.3 to 1

Peter noticed that some of his second-generation fruit flies from a cross between the pure-strain parent flies had cross veins on their wings, but others did not. He counted 64 flies with cross veins and 21 flies with no cross veins. Since he had gotten rid of the original parents and the first-generation offspring, he could not examine their appearance.

1. What were the wings of the original parent flies like?
2. What were the wings of the first-generation offspring like?

WYY
02-Core-1C

When you cross pure-strain fruit flies having long body bristles with fruit flies that are pure strain for short bristles, all of the first-generation offspring have long body bristles. Suppose you cross these first-generation offspring. Predict the ratio of long-bristled to short-bristled offspring that would result from this crossing.

WYY
02-Core-2C

Choose the statement below that best describes the pattern by which features are passed from parent to offspring.

a. The offspring show the same features as their female parent.
b. The offspring generally show some features in common with each of their parents.
c. The male offspring show the same features as their male parent, and the female offspring have the same features as their female parent.
d. None of the offspring show the same features as their parents.

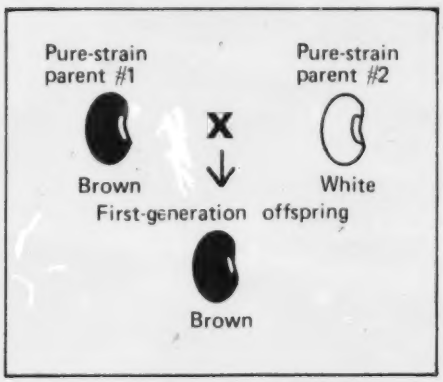
WYY
02-Core-3C

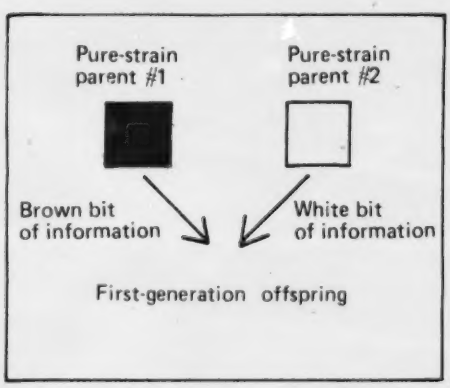
What do you call the science which deals with patterns of inheritance?

WYY
02-Core-4C

The figures below show a possible way to explain a cross between brown beans and white beans, using the one-bit model of inheritance. What are the assumptions of the one-bit model of inheritance?

WYY
02-Core-5C





WYY
02-Core-6C

Why is the one-bit model of inheritance not a satisfactory model for most features?

WYY
02-Core-7C

Heat can be described by either a particle model or an energy model. Select the most important reason for accepting one model rather than the other.

a. The scientist who developed one of the models won a Nobel Prize.
b. Your teacher told you that one model was better.
c. One model involves less math and is easier to understand.
d. One model agrees more closely with the experimental evidence.
e. A book states that one model is correct.

WYY
02-Core-8C

In developing the two-bit model of inheritance, some assumptions were made. What were these assumptions?

WYY
02-Core-9C

The inheritance of flower color in snapdragons follows the two-bit model. Yellow color masks white color. Suppose you crossed pure-strain white snapdragons with pure-strain yellow snapdragons.

1. Predict the color of the flowers of the first-generation offspring of this cross.
2. Predict the color of the flowers of the second-generation offspring of this cross. Include a ratio in your answer.

WYY
02-Core-10C

A test-cross plant is usually pure strain for the masked (recessive) variation of a feature. Why is it used rather than a plant that is pure strain for the masking variation?

WYY
02-Core-11C

Gladys crossed two pure strains of beans. One was pure strain for brown seeds (BB), and the other was pure strain for white seeds (bb). Her data are shown below.

GENERATION	PLANTS WITH WHITE SEEDS	PLANTS WITH BROWN SEEDS
Parents	1	1
1st- generation offspring	0	20
2nd-generation offspring	32	43

1. Can you explain these data, using the two-bit model of inheritance?
2. Explain your answer.

Suppose a scientist did a crossing experiment and his results were not explained by the two-bit model. He repeated his experiment several times to check his results but always got those results. Select the answer that best describes what he should do.

WYY
02-Core-12C

a. Try to change the two-bit model so that it can explain both the old data and his new data.
b. Discard the two-bit model and devise a new model that explains only his new results.
c. Ignore the results of his experiment.
d. Change his data to agree with the two-bit model.
e. Publish a paper that gives his data and states that the two-bit model is wrong and must be thrown out.

Henry wanted to find out if the red-flowering lilies he had were pure strain for flower color. He knew that in lilies, the bit for red flowers would mask the bit for white flowers. He crossed his unknown lilies with some that he knew were pure strain for red flower color. All the first-generation offspring of this cross had red flowers.

WYY
02-Core-13C

1. Was the unknown plant pure strain for red flowers?
2. Explain your answer.

A student wants to determine if a red poppy plant is pure strain for flower color. He knows that the bit for red flowers will mask the bit for white flowers. He test-crosses the unknown red-flowering poppy plant with a pure strain white-flowering poppy plant. Half of the first-generation offspring of this cross have red flowers and half have white flowers.

WYY
02-Core-14C

1. Is the unknown red-flowering poppy plant pure strain for flower color?
2. Explain your answer. You may wish to include a diagram with your explanation.

Scott wanted to find out if a purple-flowering bean plant was pure strain. He knew that the bit for purple flowers masks the bit for yellow flowers. He test-crossed his unknown bean plant with a pure-strain yellow-flowering bean plant. All the first-generation offspring of this cross had purple flowers.

WYY
02-Core-15C

1. Is the unknown purple-flowering bean plant pure strain for flower color?
2. Explain your answer.

A pure-strain dwarf plant is crossed with a pure-strain tall plant. All the first-generation offspring of this cross are tall. Explain why there are no dwarf plants among the first-generation offspring.

WYY
02-Core-16C

As it is used in the two-bit model, what is the meaning of the term *recessive bit*?

WYY
02-Core-17C

State the meaning of the term *dominant bit* as it is used in the two-bit model.

WYY
02-Core-18C

WYY
02-Core-19C

Suppose you read a report of a study of the feature variations shown below. The symbols used in the report are shown in the right-hand column of the table. After the number of each variation, indicate whether it is dominant or recessive.

FEATURE VARIATION	SYMBOLS FOR THE BIT OF INFORMATION
1. Red leaves	b
2. Brown hair	M
3. Smooth seeds	k
4. Yellow pods	T

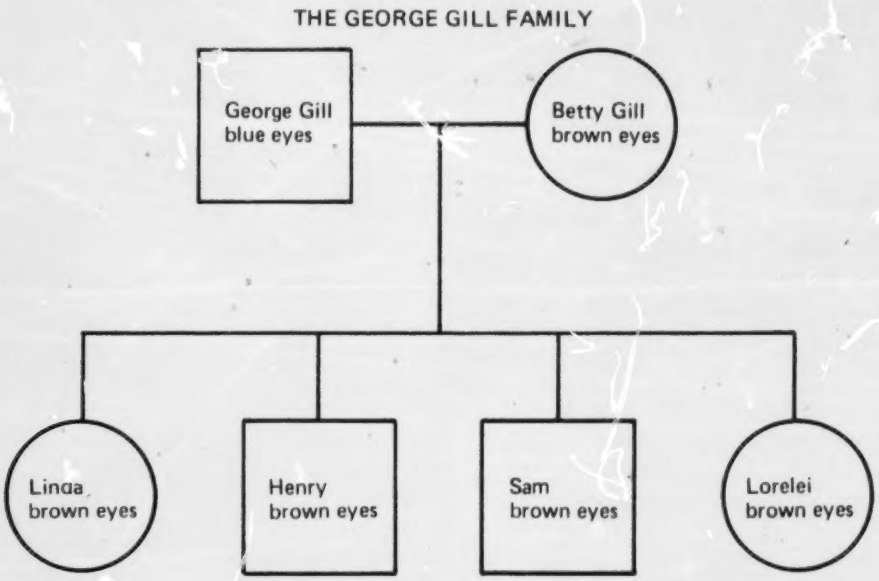
WYY
02-Core-20C

Write the numbers of the feature variations listed below. After each number, write a symbol to represent each feature variation.

1. Brown eyes (dominant)
2. Droopy ears (recessive)
3. Thin body (recessive)
4. Yellow flowers (dominant)

WYY
02-Core-21C

George's parents and grandparents all had blue eyes. Betty's parents and grandparents all had brown eyes.

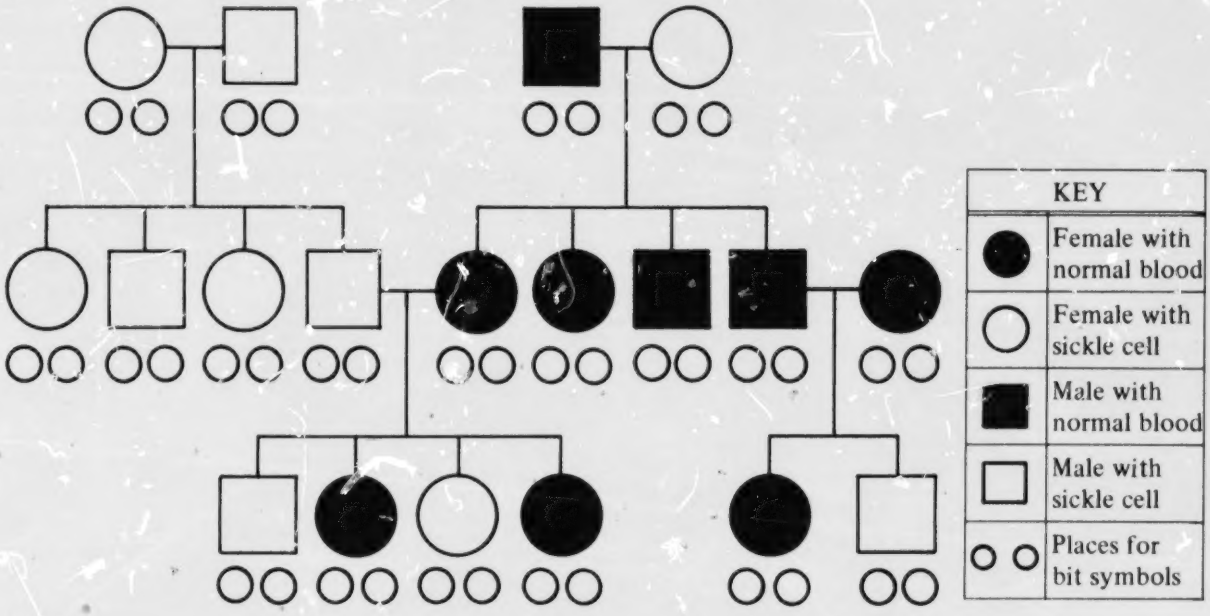


1. In the George Gill family which variation – brown eyes or blue eyes – is dominant?
2. Which variation is recessive?
3. State the reason for your answers to questions 1 and 2.

A large family was surveyed to determine the pattern of inheritance of sickle-cell anemia, a disease which causes abnormal red blood cells. Sickle-cell anemia was found to be recessive to normal red blood cells.

WYY
02-Core-22C

Ask your teacher for a copy of the chart below or paper to trace it. Determine the possible bits of information that each person shown in the chart could carry. On your chart write the bit symbols in the small circles below each large symbol. Use R to represent the bit for normal red blood cells and r to represent the bit for the abnormal red blood cells involved in sickle-cell anemia.



The bit for red flowers in a certain type of plant is dominant over the bit for white flowers. Suppose you decide to cross a plant with red flowers with a plant with white flowers.

WYY
02-Core-23C

1. Will the flowers on the first offspring plant be red?
2. Explain your answer.

Construct an inheritance chart for the inheritance of attached earlobes for the families described below. Use squares and circles and shading and nonshading. Near each square or circle, write the person's name and a possible pair of bits which that person may have. Use L for unattached earlobes and l for attached earlobes.

WYY
02-Core-24C

Grandfather Al Wilson has unattached earlobes, but Grandmother Pat Wilson has attached earlobes. Their children, Harry and Gail, have unattached earlobes.

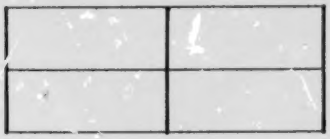
Grandfather Sam Wells has attached earlobes, but Grandmother Sue Wells has unattached earlobes. Their boy, George, has unattached earlobes. Their other child, Maria, has attached earlobes.

Gail Wilson marries George Wells. Their girl, Grace, has unattached earlobes. Their boy, Peter, has attached earlobes.

WYY
02-Exc 4-1-1C

The bit for red flowers (R) is dominant over the bit for yellow flowers (r) in snapdragons. Suppose you crossed a red-flowering snapdragon (Rr) with a yellow-flowering snapdragon (rr).

1. Use a chart like that shown below to determine the possible combinations of bits that the offspring could have.
2. What is the ratio of red-flowering offspring to yellow-flowering offspring?



Guinea pigs have five features that show variation. They are length of hair, roughness of coat, color of coat, spottedness of coat, and eye color. According to the two-bit model, what is the total number of bits that a guinea pig receives for all of these five features?

WYY
03-Core-1C

A type of moth receives information for wing size, body color, eye color, antenna shape, and wing color. The possible variations of these features are shown below.

WYY
03-Core-2C

KEY				
FEATURE	BIT	VARIATION	BIT	VARIATION
Wing size	L	large	l	small
Body color	T	tan	t	grey
Antenna shape	c	straight	C	curved
Eye color	B	black	b	brown
Wing color	d	light	D	dark

Use the key above and the two-bit model to determine the appearance of a moth that inherited the bits shown in the table below. List the feature numbers, and after each number state the variation of the feature that the moth will show. (Example: 1. small)

FEATURE NUMBER	FEATURE	BIT 1	BIT 2
1	wing size	l	l
2	body color	t	t
3	antenna shape	C	C
4	eye color	B	b
5	wing color	d	D

Suppose that the results you obtained from a fruit-fly cross did not agree with the predictions of the two-bit model.

1. What should you do to establish the value of your results?
2. How can your results affect the model?

WYY
03-Core-3C

State two reasons why Mendel was successful in understanding inheritance patterns although others before him failed.

WYY
03-Exc 6-1-1C

Mendel was successful in understanding the patterns of inheritance. In his investigation, he used the systems approach, a model, and mathematics. Explain why each of these are important for solving a scientific problem.

WYY
03-Exc 6-1-2C

WYY
03-Exc 6-2-1C

In fruit flies, the bit for long wings (L) is dominant over the bit for short wings (l). The bit for red eyes (R) is dominant over the bit for brown eyes (r). Suppose you had a fruit fly that was pure strain for red eyes (RR) and for short wings (ll). You crossed it with another fruit fly that was pure strain for brown eyes (rr) and long wings (LL). Predict the appearance of the first-generation offspring of this cross.

WYY
03-Exc 6-2-2C

You may refer to Excursion 6-2 to help you answer this check. In fruit flies, the bit for long wings (L) is dominant over the bit for short wings (l). The bit for red eyes (R) is dominant over the bit for brown eyes (r). Suppose you had a fruit fly that was pure strain for red eyes (RR) and for short wings (ll). You crossed it with another that is pure strain for brown eyes (rr) and long wings (LL). Predict the ratio of the feature variations that you would find in the second-generation offspring of this cross.

WYY
03-Exc 7-1-1C

When a red-flowering zinnia (RR) is crossed with a yellow-flowering zinnia (YY), the offspring are a mixed red and yellow, an orange color (RY). The genetic bits for the flower color do not seem to mask each other completely. Copy the charts below. Then predict the appearance of the offspring of the two separate crosses.

Chart 1.

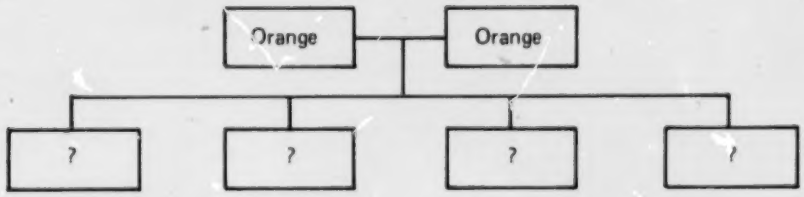
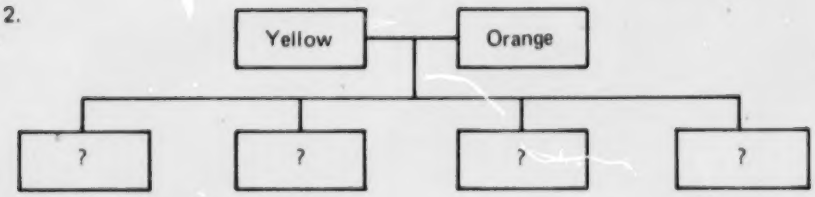


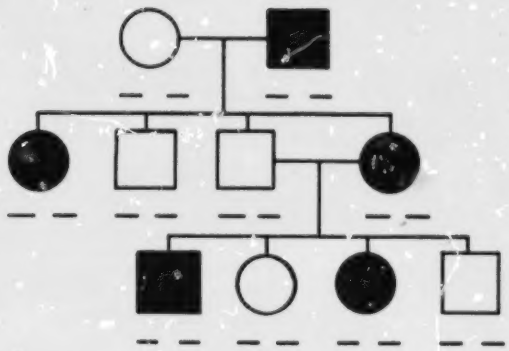
Chart 2.



Get from your teacher a copy of the chart below or paper to trace it.

WYY
03-Exc 7-2-1C

The inheritance of an extra toe in some cats is related to the cat's sex. In the males, the bit for an extra toe is dominant over the bit for no extra toe. In the females, the bit for no extra toe is dominant over the bit for an extra toe. Indicate on your chart a possible pair of bits carried by each of the cats. Use T to represent the bit for an extra toe and t for the bit for no extra toe.



KEY	
	Male with extra toe
	Male with no extra toe
	Female with extra toe
	Female with no extra toe
---	Places for bit symbols

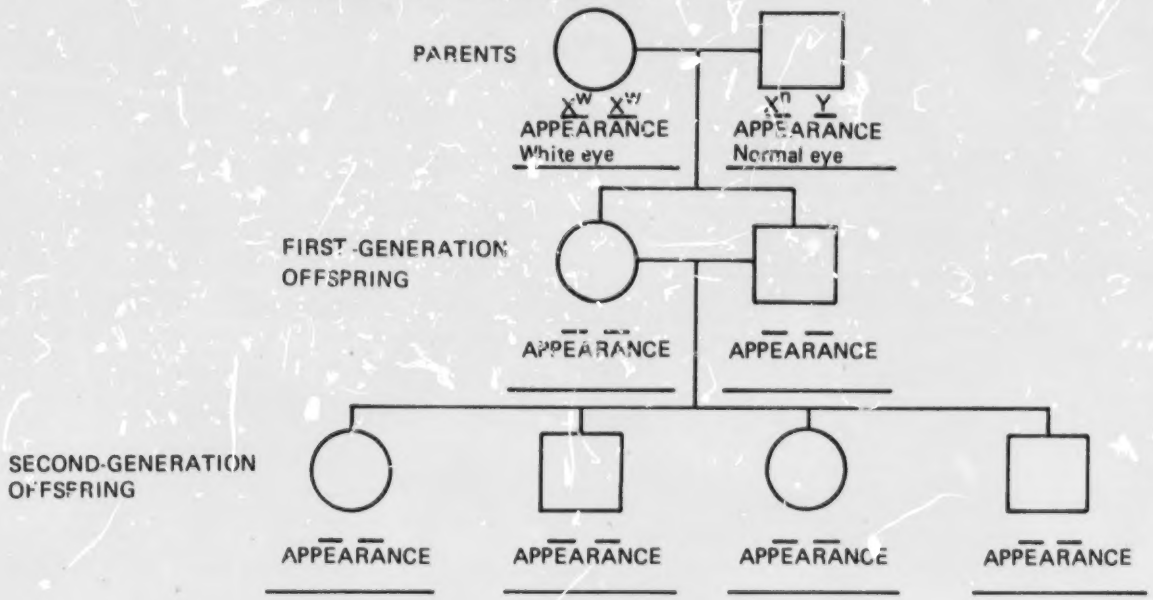
A next-door neighbor complains that his wife could produce only daughters, not sons.

WYY
03-Exc 7-3-1C

1. Is his reasoning logical when he blames his wife for the fact that all their children are girls?
2. Explain your answer.

WYY
03-Exc 7-4-1C

Get a copy of the chart labeled WYY-03-Exc 7-4-1 from your teacher. You may use Excursion 7-4 to help you do this check. In fruit flies, the X chromosome carries the bit for the recessive variation white eye color (X^w). The Y chromosome does not carry any information about this feature. The appearance of and bits for the parents are given in the chart below. You are to predict the appearance of and the bits (X^w, X^n, and Y) that will be carried by the first-generation and second-generation offspring of the cross by filling in the blanks on your copy of the chart. Remember that X^n represents the normal trait.



WYY
03-Exc 7-5-1C

Mia and Dea are identical twins. Identical twins receive identical sets of genetic materials from their parents. However, as adults, Mia and Dea do not look exactly alike. What might cause such differences?

WYY
03-Exc 7-6-1C

Suppose that a year ago you released one hundred gray mice and one hundred black mice on a rocky island. The island is composed of a gray rock, and there is very little vegetation. There is, however, an old lady living there who keeps a large cat.

1. Do you predict that there are more of one kind of mice than of the other now living on the island?
2. Explain your answer.

WYY
03-Exc 7-7-1C

At one time, the Chinese thought that women were more attractive if they had tiny feet. Mothers would wrap up their baby daughters' feet very tightly so they would not grow very much. Suppose this were done for many generations.

1. Would their girls be born with bits of information so that their feet would never grow very large?
2. Explain your answer.

Investigating Variation IV

Below are two definitions of ways in which people differ. Study these definitions, and answer the questions that follow.

IV
01-Core-1C

Definition a: A woman's *beauty index* is her ability to wear makeup well.
Definition b: A person's *swim index* is a measure of how fast she can swim short distances. It is measured by timing how long it takes her to swim 100 meters, using any stroke.

1. Which of the above is an operational definition?
2. Explain the reason for your answer.

Whenever possible, an operational definition should answer two questions. What are those two questions?

IV
01-Core-2C

Perhaps you have heard people make statements such as "All teenagers act alike."

1. Can a statement like this ever be true?
2. Explain the reasons for your answer.

IV
01-Core-3C

Many scientists spend a great deal of time looking for patterns in the way things change. Why?

IV
01-Core-4C

High school athletes differ in their ability to lift barbells of different weights above their heads. This ability is the *strength index*. Write an operational definition of *strength index*.

IV
01-Core-5C

Suppose you wanted to compare the ability of different students in your class to play the piano. From the choices below, select the best way of measuring piano-playing ability.

a. Ask each person how many times he has been paid for playing the piano in public.
b. Ask each person to play the same unfamiliar songs, and count the number of mistakes each makes.
c. Ask each person how many piano lessons he has had.
d. Ask each person to play the piano, and judge how well each does.
e. Ask someone who knows all of the piano players well to tell you who is the best player.

IV
01-Core-6C

State an advantage of using a measuring device, such as a ruler or test, rather than just relying on your senses when you want to compare different things.

IV
01-Core-7C

IV
01-Core-8C

Steve was measuring reaction time, using the dropping-meterstick method. He found that Candy had a much shorter reaction time than anyone else. He also noticed that she watched his hand release the meterstick. All the other students had watched their own fingers with which they caught the meterstick. Steve concluded that a student's reaction time, as measured by the dropping-meterstick method, is shorter when he watches the release of the meterstick than when he watches the catch point. Describe an activity that you could perform to test this idea.

IV
01-Core-9C

Suppose you read that a feature shows continuous variation. What does that mean?

IV
01-Core-10C

Suppose you read that a feature shows *either-or* variation. What does that mean?

IV
01-Core-11C

Identify each of the variables below either as a continuous variable or as an either-or variable.

1. How fast a secretary can type
2. Whether a girl is a nurse
3. The length of a man's beard
4. If a man is a lawyer or not
5. A person's weight

IV
01-Core-12C

Alex measured the number of times the students in his homeroom could jump rope. His measurements are shown below.

Bruce – 143	Myna – 165	Tom – 147
Wendy – 152	Isabel – 140	Stephanie – 180
Greg – 150	Fred – 145	Louise – 162
Betty – 170	Susan – 167	Jim – 178
Hank – 153	Wayne – 162	Brian – 153
Charles – 158	Janice – 167	Mary – 173

Copy the table show below, and complete it, using Alex's measurements.

NUMBER OF ROPE JUMPS	TALLY	TOTAL
139-146		
147-154		
155-162		
163-170		
171-178		
179-186		

Give two reasons that scientists usually arrange their data in charts, tables, or graphs.

IV
01-Core-13C

Barney wanted to determine how many students in his class took part in sports and how many did not. Construct a table for collecting and analyzing his measurements.

IV
01-Core-14C

Esther wanted to measure how many sit-ups her classmates could do in two minutes. At a given signal, all the students began counting to themselves as they did sit-ups. At the end of two minutes she stopped them and asked them how many sit-ups they had done. Her data are shown in the table below. Construct another table of all her sit-up measurements from which Esther will be able to construct a histogram. (Note: You need only to construct the table, not to enter the data in the table.)

IV
01-Core-15C

STUDENT	NUMBER OF SIT-UPS DONE	STUDENT	NUMBER OF SIT-UPS DONE
Orson	20	Yvonne	32
Hank	23	Oona	35
Sarah	30	Una	36
Ann	36	Sally	42
Yancy	40	Ellen	27
Carol	44	Enid	21
Alice	26	Ira	46
Neil	23	Tom	44

Freda wants to determine if there is any relationship between whether a student is right-eyed or left-eyed and whether he sits in the front or back of the classroom. Construct a table for collecting and analyzing measurements to find out if these variables are related.

IV
01-Core-16C

Jim wants to find out whether a relationship exists between the sex of a student and his or her grades in school. Construct a table for collecting these measurements.

IV
01-Core-17C

Your teacher will observe you for this check when he can.

IV
01-Core-18C

Your teacher will observe you for this check when he can.

IV
01-Core-19C

Your teacher will observe you for this check when he can.

IV
01-Core-20C

IV
01-Core-21C

Your teacher will observe you for this check when he can.

IV
01-Core-22C

Your teacher will observe you for this check when he can.

IV
01-Exc 1-1-1C

1. Suppose you measured the thickness of your ISCS textbook in metric units. Which of the measurements given below would be closest to your measurement?

a. 70 mm	d. 7 m
b. 7 mm	e. 0.7 mm
c. 700 m	f. 7 cm

2. Suppose you measured the length of a 25-yard swimming pool in metric units. Which of the measurements given below would be closest to your measurement?

a. 2.3 m	d. 230 m
b. 23 m	e. 230 cm
c. 230 mm	f. 23 cm

IV
01-Exc 1-1-2C

1. What is the distance between A and C in centimeters?
2. What is the distance between B and C in millimeters?

IV
01-Exc 1-1-3C

Denise measured the length of a board as 91.83 cm. Debbie measured the length of the same board as 91.86 cm. What is the most likely reason for the difference in their measurements?

IV
01-Exc 2-1-1C

Calculate the average of the following measurements to one decimal place.

6.1 cm
8.4 cm
2.9 cm
1.8 cm

Round off the following measurements to the nearest whole number. IV
01-Exc 2-1-2C

1. 114.2 mm
2. 648.6 mm
3. 199.2 mm
4. 955.5 mm
5. 276.0 mm

Claudia measured the handedness of each of her classmates. She separated the results for the boys and girls. Her data are shown below. IV
01-Exc 2-2-1C

		HANDEDNESS		
		LH	RH	Totals
SEX	Boys	3	11	14
	Girls	4	12	16
	Totals	7	23	30

Suppose someone made the statement that girls are more likely to be left-handed than boys.

1. Could you use Claudia's data to tell if the statement is correct?
2. Explain your answer.

Suppose someone else said that boys are more likely to be right-footed than girls.

3. Could you use Claudia's data to tell if this statement is correct?
4. Explain your answer.

State whether each of the pairs of words below represents a continuous or an either-or variable.

IV
02-Core-1C

1. Cat or mouse
2. Tall or short
3. Top or bottom
4. Male or female

Pam's data had a wide range. Give an operational definition for the term *range* as it is used in that sentence.

IV
02-Core-2C

Brian measured the number of chin-ups the boys in his class could do. His data are shown below.

IV
02-Core-3C

STUDENT	NUMBER OF CHIN-UPS	STUDENT	NUMBER OF CHIN-UPS
Fred	23	Bill	6
Charlie	18	Tom	15
Doug	17	Roger	32
Henry	27	Jim	18
Tim	13	Carl	12

What is the range of his measurements?

Write an operational definition for the *mean* of a set of measurements.

IV
02-Core-4C

Sally measured how long it took each of the girls in her class to run 100 meters. Her data are shown below.

IV
02-Core-5C

STUDENT	TIME (in sec)
Steph	22
Kay	20
Denise	25
Debbie	23
Candy	17
Dorothy	23
Theresa	14
Linda	19

Calculate the mean of her measurements to the nearest whole number.

IV
02-Core-6C

Define the *mode* of a set of measurements.

IV
02-Core-7C

Glenda asked her classmates to keep track of the number of hours of homework they did in a week. Her data are shown below.

STUDENT	TIME (in hours)	STUDENT	TIME (in hours)
Cathy	3	Janice	6
Bruce	15	Henry	12
Mike	18	Bob	15
Sheila	27	Joyce	13
Doug	10	Wendy	29
Barbara	7	Nick	5

What is the mode of this set of measurements?

IV
02-Core-8C

Horace measured the number of times each student in his gym class could chin himself. His table of data is shown below.

NUMBER OF CHIN-UPS	NUMBER OF STUDENTS
1-5	3
6-10	4
11-15	7
16-20	10
21-25	5
26-30	2
31-35	1
36-40	1

Get a piece of graph paper from your teacher. On it, construct a histogram of Horace's data.

IV
02-Core-9C

State why data are often arranged in histograms or in other kinds of graphs.

Steve participates in a city-wide gymnastic team. He measured how many times each team member could chin himself. His data are shown below. **IV 02-Core-10C**

60 70 63 59 58 71 61 58 73 59
67 54 63 61 64 62 65 58 60 62
61 58 59 60 57 68 62 64 61 55

Construct a table like the one below, and group Steve's data in fifths.

FIFTH	LIMITS OF RANGE FOR THAT FIFTH	NUMBER OF INDIVIDUALS
1		
2		
3		
4		
5		

Scientists will often do an experiment, collect some data, and draw a conclusion from their data. Then they will repeat the experiment, collecting even more data. Explain why some experiments are repeated many times. **IV 02-Core-11C**

In the experiment in which you measured each student's peripheral vision, you were told to take three measurements for each student and to average them. Why was it better to take three measurements rather than one? **IV 02-Core-12C**

The students of Lawrence Junior High School were selling cakes to raise money for the music club. Lloyd was in charge of keeping the records for his class. The number of cakes each student sold is shown below. **IV 02-Core-13C**

1. Is the number of cakes Jim sold above or below the mean for the whole class?
2. How far above or below the mean is it?

STUDENT	NUMBER OF CAKES SOLD
Harold	7
Jim	9
Cindy	15
Karen	7
Laura	24
Hank	9
Elaine	18
Pat	5
Ted	22
Rick	0

IV
02-Core-14C

Pete had a bag full of wooden pieces for a puzzle. He wanted to practice the use of the metric ruler and decided to measure the length of each piece. The table below shows his results.

PIECE NUMBER	LENGTH (in cm)
1	4
2	3
3	6
4	8
5	3
6	6
Total length	30
Mean length	5

How is it possible for the mean length to be 5 cm although none of the pieces were 5 cm in length?

IV
02-Core-15C

Her science teacher asked Helen to give him a definition of an average person. Helen read from the text that "Perhaps the best example of an average [normal] person is someone whose characteristics are *not* average." Explain this statement.

IV
02-Core-16C

Jason was assigned to measure the width of the index finger of a Rhesus monkey. It measured 4 cm from the joint.

1. Based only on the data above, is it possible to determine if the finger is a large, medium, or small index finger?
2. Explain the reason for your answer.

IV
02-Core-17C

Suppose you are a subject for a test of touch sensitivity and for a test of the ability to locate objects by hearing. You are told to keep your eyes closed during the tests.

1. Is it necessary for you to keep your eyes closed during the tests?
2. Explain your answer.

Joe put 80 beans into a glass jar. He asked ten different people to estimate how many beans were in the jar. Their estimates are shown below.

IV
02-Core-18C

NAME	ESTIMATE
Sue	85
Bob	90
Debby	60
John	70
Del	76
Burt	65
Helen	45
Harry	69
Kate	46
Bill	78

What is the mean error of these estimates? Show your calculations.

Suppose you had several people estimate the length of time that passed as a circus performer walked from one end of a tightrope to another. You then calculated the mean error of their estimates. Why is the mean error of measurements calculated?

IV
02-Core-19C

Joe tested several students to see how accurately they could estimate when 13 seconds had passed. His data are shown below.

IV
02-Core-20C

STUDENT	ESTIMATED TIME (in seconds)
Jim	9
Susan	12
Nancy	7
Frank	19
Carol	11
John	13
Sally	16
Mary	19
Wes	10
George	14

What is the mode error for the time sense of these students? Show your calculations.

IV
02-Core-21C

When Dr. Salmon and Dr. Levi review data collected from groups of people, they look for patterns and similarities within each group. Many researchers are concerned only about such patterns and similarities. Why are the researchers more concerned about similarities than about individual differences?

IV
02-Core-22C

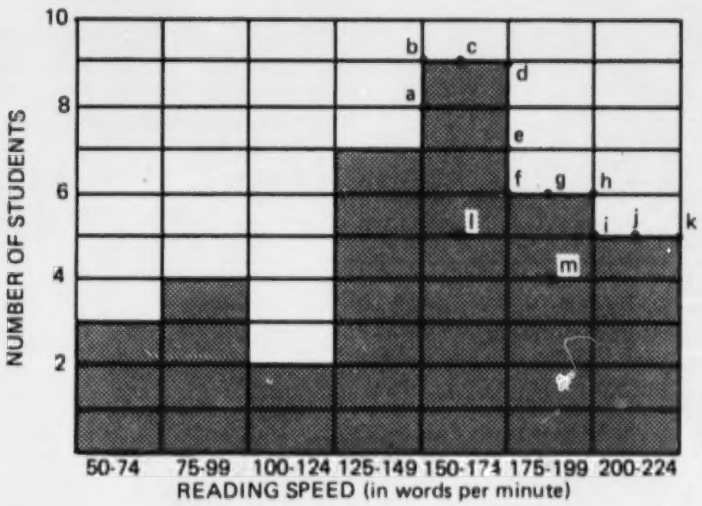
In a recent study of the characteristics of adult male Kile Islanders, it was found that their mean weight was 63 kg. Tale-ki is one of the adult males weighed.

1. Using only the above information, can you determine Tale-ki's weight to the nearest kilogram?
2. Explain your answer.

IV
02-Exc 3-1-1C

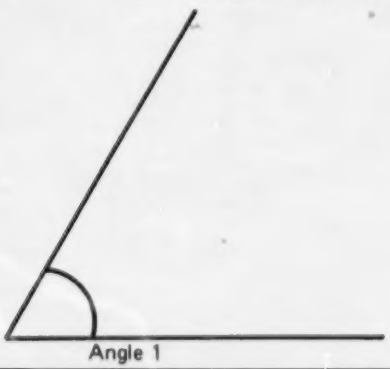
Mr. Murphy tested his students' reading speed. He plotted a histogram of the data collected.

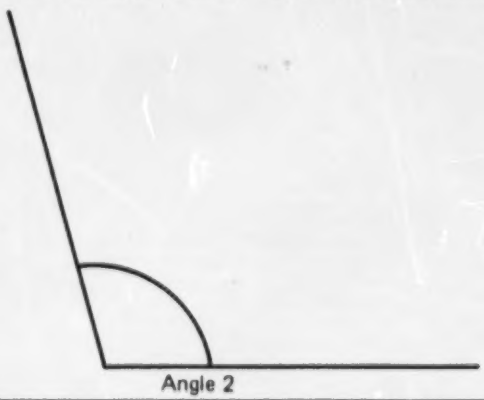
1. List the letters of the points on the histogram that he should use to change the histogram into a graph.
2. What are these points called?



IV
02-Exc 4-1-1C

Use a protractor to measure the size of the two angles below. Record your answers on a separate paper.





Use your protractor to construct angles of 45° and 128° on your answer sheet, and label each of them.

IV
02-Exc 4-1-2C

Animals with different characteristics often live in different areas, eat different food, and have different enemies. The chart below shows some of the differences between two kinds of animals.

IV
02-Exc 4-2-1C

CHARACTERISTICS	ANIMAL A	ANIMAL B
Type of animal	large bird	large, hooved animal
Living area	nests on mountain ledges	open, flat plains
Main food	small animals	grasses
Method of feeding	swoops down from the sky at high speed	grazes grass
Enemies	man	large members of the cat family

1. Would it be advantageous for animal A to have its eyes in the sides of its head or in the front of its head?
2. Explain the reason for your answer.
3. Would it be advantageous for animal B to have its eyes in the sides of its head or in the front of its head?
4. Explain the reason for your answer.

A standard set of fingerprints is shown below. If you studied your fingerprints, you would find they are not exactly like any of these. Why?

IV
02-Exc 4-3-1C

Plain arch | Tented arch | Loop | Plain whorl

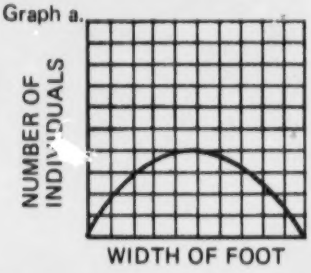
IV
02-Exc 5-1-1C

Most of the time, researchers measure the characteristics of a population by measuring only a sample of that population. Why do they use a sample rather than measuring the entire population?

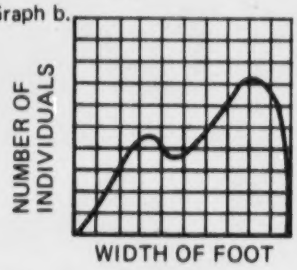
IV
02-Exc 5-1-2C

Which one of the curves below is a normal curve?

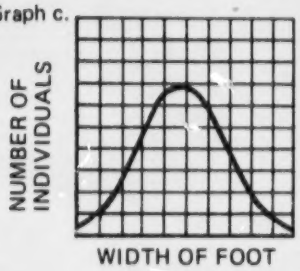
Graph a.



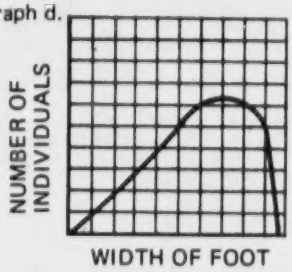
Graph b.



Graph c.



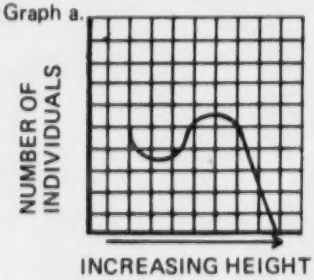
Graph d.



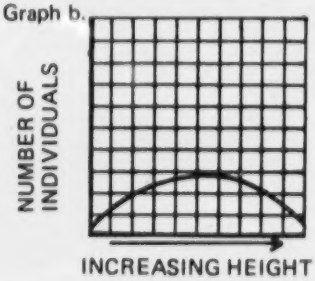
IV
02-Exc 5-1-3C

Suppose you were going to measure the continuous human variable height. You would select a random sample of people, measure their heights, and draw a graph of the results. Which of the graphs below would you expect your graph to look like?

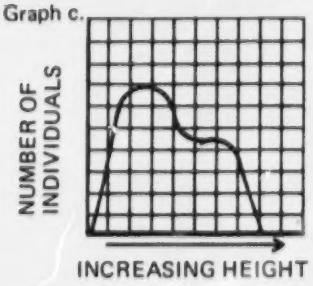
Graph a.



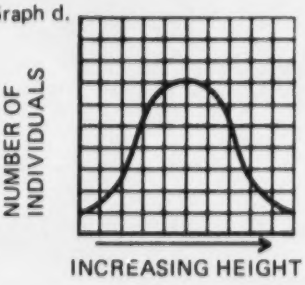
Graph b.



Graph c.



Graph d.



State what is mean by the term *random sample.*

IV
02-Exc 5-1-4C

Researchers are very careful to try to get a random sample. What is the purpose of a random sample?

IV
02-Exc 5-1-5C

Mary Jean wanted to determine how many novels the people in her neighborhood read each month. She didn't have time to ask everybody in the neighborhood, so she stood next to the bookmobile in the neighborhood shopping center and asked the first 25 people who went into the bookmobile how many novels they had read during the last month.

IV
02-Exc 5-1-6C

1. Was her sample a random sample?
2. Explain your answer.